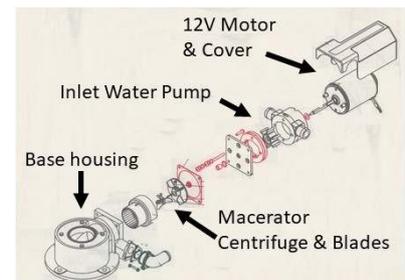


AOR TMC Toilet - macerator assembly replacement process

Warning: This process requires the TMC Toilet bowl to be emptied plus the waste discharge hose and fittings to be handled. Appropriate personal protective equipment (PPE) must be worn when undertaking any work on any part of the black water system as the fluids and parts could be contaminated by human waste products.

1. The AOR Series 4 vans fitted with a macerator toilet unit are fitted with a Model TMC-99902 Electric Marine Toilet with Small bowl & Std Plastic Seat & Cover. It has a 12 Volt motor rated at 18 Amps, which is protected by a 30 Amp Fuse located in the 6 Blade Fuse Holder near the van's house batteries.
2. The toilet has a number of basic parts including:
 - a. Seat & lid
 - b. Flush Water Hose (the feed line from the feed water pump to the bowl)
 - c. A motor assembly that integrates the electric motor with a water pump and the macerator centrifugal impeller and razor blades.
 - d. A base housing that the motor; water pump, and macerator internals bolt to.
 - e. Additionally, there are numerous nuts and bolts, and other fixtures attached to the parts listed at 2.a – 2.d above and these will be discussed as necessary in the procedure below.
3. **Tools Required.** Tools required for this task are basic and include:
 - a. No.2 Phillips Head screwdriver;
 - b. 10mm ring spanner;
 - c. 7mm (9/32" will do in a pinch) open ended spanner or long nosed pliers in lieu;
 - d. cutting snips;
 - e. wire strippers;
 - f. waterproof silicon sealant, and a
 - g. soldering iron.
4. Once it has been established that the toilet's macerator unit needs to be replaced, AOR recommend that the base housing and motor assembly be replaced as one unit rather than attempting to repair individual parts of this motor/pump/macerator assembly.
5. **Materials Required.** Parts needed to complete this overhaul include:
 - a. replacement base and motor assembly, Pt. No. PUM-SAA-05 (AOR)
 - b. solder;
 - c. 250mm lengths red & black 12 AWG (or similar) wire;
 - d. two 300mm cable ties;



- e. heat shrink to suit cable size, and
- f. PPE; cleaning materials, including disinfectant and disposable rags.

6. **Removal of Toilet assembly.** The toilet can be removed as one piece or progressively piece by piece. The decision of which way to go is yours but should be aware that the unit weights 16 kg. The procedure that follows covers both processes. Steps identified as ‘*mandatory*’ are the minimum required to remove the toilet from the van in one piece. The intermediary steps identified as ‘*optional*’ are the steps to be followed in addition to the mandatory steps to remove the toilet piecemeal.

- a. [Mandatory]: Deactivate the power to toilet by removing the 30 Amp fuse from the 6 Blade Fuse Holder located near the van’s house batteries.

Warning: Switching off the Accessory Switch (ACC) does not switch off the power to the toilet macerator motor and blades.

- b. [Mandatory]: Ensuring you are wearing all appropriate PPE, remove as much fluid and waste product from the toilets bowl as possible (if necessary, fill with clean water and re-empty). Dispose of all waste and cleaning products appropriately.

- c. [Mandatory]: Remove the Motor Assembly Cover. This should lift off vertically.



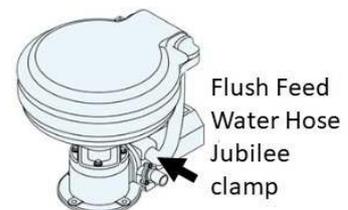
- d. [Mandatory]: Cut the wires that run between the shower recess floor and the motor assembly one at a time with wire snips. The wires should be cut as close to the motor body as possible.

- e. [Mandatory]: Remove the screws from the chrome decorative plates that cover the floor through holes for the Water Feed Inlet hose (driver side of toilet) and the Waste Discharge hose (passenger side of the toilet). The plates can then be gently prised from the floor (they may have a ring of silicon sealing them to the shower cubical floor).

Note: These plates need to be free to enable the hoses to flex or be moved when they are disconnected later in the process.

- f. [Optional]: Remove the toilet seat and lid by undoing the two retaining nuts found under the back lip of the toilet. This is like any standard toilet assembly found in a house.

- g. [Optional]: Undo and slide away (or remove) the Jubilee clamp from the Flush Water Feed Line where it connects to the toilet motor assembly, and remove the hose from the motor assembly. Rags should be placed under this hose connection to collect any fluid spillage.



Warning: If your van has a recycled system installed, the water that escapes from this feed line is likely to be grey water and must be treated as a hazardous substance. If you do not have a recycle system installed, the water should be potable water.

Note: A heat gun may be needed to soften the hose to enable ease of removal. Don't place the heat gun too close to hose. Apply heat evenly to the end of hose for around 20 seconds. Twist and pull the hose off the base assembly. Reapply heat and retry if required. A hair dryer will also work if no heat gun is available.

Warning: Ensure the hose is not overheated. Leather gloves will provide your hands some protection when removing a heated hose.

- h. [Optional]: Remove the 4 bolts (and their plastic caps if still installed) that hold the toilet bowl to the base assembly. The toilet bowl can then be removed from the shower recess.

Note: Between the bowl and the base assembly, there is a large neoprene rubber seal. The replacement assembly should be provided with a new seal but if it did not, keep this seal as it will be needed to be refitted when re-assembling the toilet.



- i. [Mandatory]: Undo and slide off or remove the Jubilee Clamp from driver side white hose where the hose connects to the motor assembly.
- j. [Mandatory]: Undo and slide off or remove the Jubilee Clamp from the passenger side remaining/forward white hose where the hose connects to the base assembly.



Warning: Any fluid that leaks from this connection must be treated as being contaminated by human waste products.

- k. [Optional]: Undo and remove the three bolts and nuts from the waste discharge hose fitting that hold the small fitting to the base assembly.
- l. [Optional]: With this fitting free, carefully pull it away from the base assembly and note how the neoprene rubber flap is installed. If you have any concerns on recalling how it was installed: take a photograph!

Note: It is vitally important that on reassembly, that this valve flap is repositioned in the same way for it to work properly.



- m. [Mandatory]: With this small waste discharge fitting free of the base assembly, wrap a rag/plastic bag around the end of the discharge hose to minimise leakage from the hose back into the shower recess: your working area!
- n. [Mandatory]: Undo and remove the 5 stainless steel coach bolts that hold the base assembly to the shower recess floor.
- o. [Mandatory]: Gently rock the toilet/base assembly from side to side and back to front to break a silicon bead that attaches the base assembly to the shower floor and seals the bolt holes.

Caution: Do not leaver off with the aid of any tools!

- p. [Mandatory]: With the toilet/base assembly loose, you should be able to remove the water feed inlet hose from the driver's side of the base assembly.

Note: A heat gun may be needed to soften the hose to enable ease of removal. Don't place the heat gun too close to hose. Apply heat evenly to the end of hose for around 20 seconds. Twist and pull the hose off the base assembly. Reapply heat and retry if required. A hair dryer will also work if no heat gun is available.

Warning: Ensure the hose is not overheated. Leather gloves will provide your hands some protection when removing a heated hose.

- q. [Mandatory]: Remove the base assembly/toilet from the van.

Note: If you have removed the toilet as a single unit, then the optional steps missed between 6.a and 6.q above should now be done and the discrete parts cleaned as appropriate.

7. **Preparation for re-installation:** Before installing the new Base Assembly, there are a number of activities to be undertaken as follows:

- a. Where the base assembly sat on the shower recess floor, the remnant silicon must be removed. Removal of most can be achieved carefully using a razor blade or similar. Wiping the base area with 'White Spirits' or 'Mineral Turpentine' will also help remove any smears of silicon that a razor blade won't remove.

- b. Check that the wood where the base bolts screw into is still sound.

Note: There is potential for water to bypass the silicon used to seal the base and its bolts on assembly and penetrate the structural timber below the fibreglass skin. If this has occurred, contact AOR Service for advice.

- c. Extend the power cables that protrude through the floor:

- i. Strip each cable coming through the shower base, and the ends of the 250mm cable extension.

Note: If you are using twin core cable, before soldering the wires slide a small length of heat shrink onto each wire. You need to cover each joint after soldering is complete.

- ii. Solder each extension wire to the appropriate colour wire protruding through the floor, and shrink a piece of heat shrink over each joint.

Note: If the length of wire protruding through the floor is quite small and makes soldering on the new extension difficult, an additional length of free cable is available under the shower recess floor. To access this additional length of cable, the silicon that seals the through floor hole must be removed carefully (carefully to avoid damaging the wires) and then you can pull through the free wire through before soldering the new joints. The through hole must be re-sealed with an appropriate water proof silicon sealant.

- iii. A second piece of heat shrink should then be applied to cover both joins. It is important that this piece of heat shrink is considerably longer than the two individual pieces applied directly to each joint. This will help ensure the joint(s) remain water tight.

Note: *By keeping this assembled joint as flat as possible, the new cable length should still be able to fit under the re-installed motor cover.*

8. **Installation of Toilet assembly.** Like its removal, the toilet can be reinstated as one piece or progressively piece by piece. The decision of which way to go is yours. The procedure that follows covers both processes. Steps identified as 'mandatory' are the minimum required to reinstate the toilet into the van in one piece. The intermediary steps identified as 'optional' are the steps to be followed in addition to the mandatory steps to rebuild the toilet piecemeal.

- a. [Mandatory]: Unpack the new base unit and remove the blackwater outlet fitting by removing the 3 screws and neoprene rubber valve flap. Note the position of the valve flap.
- b. [Optional]: Place new rubber gasket on top of new base unit. Ensure it is orientated correctly and all holes align.
- c. [Optional]: Bolt the toilet bowl to the new base assembly. Be careful not to overtighten the bolts as this could break the ceramic bowl. Reposition the plastic bolt head covers.
- d. [Optional]: Ensuring that the Jubilee clamp is on the Flush Water Feed Hose, refit the hose end to the Motor Assembly pump outlet. Slide the Jubilee clamp into position and lightly tighten.

Note: *The use of a heat gun to soften the hose may aid its re installation.*

- e. [Optional]: Set the toilet assembly aside.
- f. [Mandatory]: Place a bead of silicon on the shower base to water proof and stick toilet base unit to shower floor. Use the holes in the floor as a guide. Place some silicon in the coach bolt holes to help provide a waterproof seal to the structural timber.

Note: *The silicon used must be identified as a multipurpose adhesive and waterproof sealant.*

- g. [Mandatory]: Ensuring the Jubilee clamp and decorative chrome plate are on the Water Feed Inlet hose, refit the hose to the base assembly. With the hose attached, position the base assembly onto the shower floor ensuring the bolt holes are aligned, and press down gently. If no excess silicon is evident around edges of base unit, remove the assembly and apply another bead of silicon.

Note: *Pre warming the hose end with a heat gun may assist with sliding the hose end onto the base assembly fitting.*

- h. [Mandatory]: Bolt the base assembly to the floor using the 5 stainless steel coach bolts removed when disassembling the unit. Ensure the soft plastic 'seals' are installed correctly.

- i. **[Mandatory]:** Remove any excess silicon from around the floor/base assembly joint with paper towel and soapy water if the silicon is still 'wet'. If you leave this till later, then White Spirits' or 'Mineral Turpentine' should be used.
- j. **[Mandatory]:** Lightly tighten the Water Feed Inlet Hose Jubilee clamp. Waterproof Water Feed Inlet hose by running a bead of silicon between hose and shower recess base. Remove surplus silicon and screw down the decorative plate.
- k. **[Mandatory]:** Ensuring the Jubilee clamp and decorative chrome plate are on the Waste Discharge hose, and the Waste Discharge fitting is connected to the Waste Discharge hose, reconnect the Waste Discharge fitting to the base assembly ensuring the new rubber valve flap is aligned and positioned correctly. Lightly tighten the Waste Discharge hose Jubilee clamp, waterproof Waste Discharge hose by running a bead of silicon between hose and shower recess base and screw down the decorative plate.

Note: *The photo taken of the orientation of the neoprene rubber valve flap can be used to ensure the new valve flap is installed correctly.*

- l. If you pre-assembled the toilet bowl and base assembly as per steps 8.a through 8.d above, then go to step 8.n below, otherwise proceed to step 8.m below.
- m. With the base assembly bolted to the floor, undertake steps 8.b through 8.d above. You could also refit the toilet seat.
- n. **[Mandatory]:** Use two appropriately sized and rated electrical joiners to connect the new motor wires to the extended power leads. Ensure the cables are connected positive to positive and negative to negative.

Note: *For ease of access, if you have installed the toilet piecemeal, this step can be undertaken between steps 8.k and 8.m above.*

- o. **[Mandatory]:** Waterproof these connections by again using a suitable sized piece of heat shrink, or wrapping with a sealing type electrical tape.

Note: *There are numerous options for water proof tape available from the various hardware stores and trade electrical suppliers.*

- p. **[Optional]:** To ensure the cables stay in place under the motor cover, the cables may be tied to the motor using cable ties.

- q. **[Mandatory]:** Clean the area.

- r. **[Mandatory]:** Reinstate the 30 Amp fuse.

- s. **[Mandatory]:** Test the toilet:

- i. Prime the water flush line and pump by pressing the flush button for 5 seconds. If flush water is not evident, wait 20 seconds and press the flush button again.
- ii. If water is still not available re-prime the toilet as per the note below

Note: *To prime the pump, backfill the flush water feed line (and pump) using a hose attached to the van's front tap (if a mains supply is not*

available). Take the fitting off the end of hose, flatten the hose slightly and place it pointing up under the toilet bowl's rim at the rear of toilet bowl where water normally enters the toilet bowl from the flush supply: then have the water turned on slowly. The amount of water running back into the bowl will increase sharply when the feed line and pump are full of water.

- iii. If water is still not available, check:
 1. all hose connections for leaks and rectify as appropriate, and
 2. that the power cables are joined to the motor correctly.

Note: The motor will run backwards and be unable to prime the toilet if wired incorrectly.

Note: If the flush water still fails to flow, then reference to the fault-finding section of the AOR manual "AOR - Series 4 Systems Manual - Black Water System" or the AOR Service Team is recommended.

9. If you have any concerns over any aspect of this process, you should contact AOR Service.

Additional Notes:

1. **Jubilee Clamps:** It is possible that the jubilee clamps fitted to the TMC toilet macerator assembly are the type where the drive in the clamp band allows the worm drive to come into contact with the hose being clamped (picture 'A' below). An outcome of this is that the end of the hose could become serrated, weakening the end of the hose and potentially leading to its failure. If this is the case, and you have the opportunity, it is recommended that the jubilee clamps be replaced with the type that does not allow the worm to come into contact with the hose being clamped: see Picture 'B' below for an example of one with an internal shield.



Picture 'A'



Picture 'B'

2. **Flush Water Feed & Waste Discharge hose – additional length:** AOR make provision for a small amount of additional hose (i.e.: less than 40mm) under the shower recess floor for both of these hoses should the ends become hard or damaged. If access to this additional length is required, then the silicon surrounding the hose where it penetrates the floor must be carefully removed to allow you to pull the excess hose up through the floor penetration hole (*carefully to avoid damaging the hose*). After the hose is pulled through and trimmed to suit reinstallation of the appropriate fitting, the through penetration hole must be resealed using a suitable water proof silicon adhesive sealant.